

Development of a **Carbon County GeoAtlas**

for
Emergency Responders

Submitted jointly by

Carbon County Disaster & Emergency Services

And



Red Lodge Fire & Rescue / Rural Fire District 7

In conjunction with
Carbon County Sheriff's Office
Carbon County Search & Rescue

February 13, 2009

A grant application submitted to the
Montana Land Information Grant Program

1. Primary Applicant:

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2. Other Project Participants or Partners:

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3. Date Submitted: February 13, 2009	4. Date Received by State:
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5. Descriptive Title of Project: Carbon County GeoAtlas for Emergency Responders

1. Project Goals, Objectives and Risks

Carbon County is working toward the deployment of an enhanced 911 system to improve emergency response by fire departments, ambulance teams, city police and county sheriff. Road centerlines and residential/commercial structures have been mapped using GPS and GIS and the Master Street Addressing Guide or MSAG is near complete. We anticipate the E911 system to be operational by summer 2009.

However, E911 deployment within the dispatch center is only part of the solution to improving emergency response in the County. We still have many issues related to the new rural addressing system that was put in place as part of the E911 system. Our two major needs at this time are 1) distribution of road and address information (MSDI framework layers) to responders to help them navigate to the new addresses, and 2) identification and correction of on-the-ground compliance problems with the rural addressing system. These often include private roads that are not properly signed and homes that have no or incorrectly posted addresses.

These needs have raised the following questions: **First, how do we disseminate transportation/addressing data to emergency responders, with varying levels technological sophistication, in a cost-effective and user-friendly format? Second, how can we facilitate the correction and enhancement of rural address data by emergency response teams?**

Mapping-grade GPS with ArcPad software was explored as a possible way to distribute the road/address databases to emergency responders. However, this approach is cost prohibitive and concern was raised that the technology itself may be a barrier to its adoption. We have also reviewed spiral-bound paper map atlases as a way to distribute this information. Paper atlases are easier to use and cheaper to produce but they several limitations. Most notably, paper maps are static representations of the GIS database and cannot be easily updated.

Due to these limitations, we propose to develop a new product which may serve as a model to deliver and capture data to support the MSDI transportation framework layer. This approach will utilize traditional paper maps in combination with emerging spatial technologies to support deployment to a variety of end-users including those considered “technology-challenged”.

Our product is a digital map atlas called the **Carbon County GeoAtlas**. The GeoAtlas will consist of over a 1,000 pages of detailed road/address maps for the County delivered on DVD and also the World Wide Web. The maps will be organized into a logical system of print-ready maps with each having optional topographic, aerial or cadastral base maps (see Appendix A for sample page).

Unlike traditional map atlases, our digital GeoAtlas will provide flexibility and ease-of-use to emergency responders with and without access to computer resources. Most of Carbon County’s fire and ambulance districts are very rural and don’t have access to computers. For this reason, printed versions of the GeoAtlas can easily be produced to best suit their needs. Also, the GeoAtlas can be printed-on-demand for specific areas which will result in cost-savings. Fire/ambulance and city police districts will be able to print just the area they need, when they need it.

More advanced responders, such as the Red Lodge Fire & Rescue, will benefit from the unique features the digital version of the atlas will have to offer. One such feature is the **GeoPDF** format of the maps. GeoPDF is a published extension to the Adobe PDF file format from TerraGo Technologies (www.terragotech.com) and provides several advantages:

- Automatically embeds projection coordinate systems (e.g., UTM or State Plane) within the PDF
- Maintains map layers within the PDF
- Enables attribute search within a single map or across a set of maps with Acrobat Object Data
- Gives map users the ability to find and zoom to attribute data
- Allows map users to measure distance and bearing or area.

In other words, the GeoPDF format will provide GIS-like functionality without the complexity or expense of GIS. Most everyone is comfortable with the way a PDF file works, so most people can begin using GeoPDF files with little or no training.

Another unique feature of the GeoAtlas is that it will allow responders to collect data directly on the printed map pages using **Capturx™ for ArcGIS** (www.adapx.com). Capturx will allow maps from the GeoAtlas to be marked up with a digital pen which digitizes and integrates the data directly into ArcGIS. GIS data updates and redline annotations are stored on the digital pen and linked to the original GIS geodatabase. Docking the pen to the computer instantly updates the GIS database without any scanning or re-digitizing paper-based information.

The GeoAtlas/digital pen combination will allow emergency responders to routinely update the GIS database by marking homes without posted addresses or roads without proper signage. This will allow the Carbon County DES office to identify homes not in compliance with rural addressing standards and send out notifications to correct the situation. In addition, the digital pen will greatly speed pre-fire field surveys and triage situations.

We believe that the GeoAtlas prototype may serve as a model for other Counties to use and will advance data collection and distribution of the transportation/addressing framework layer across multiple jurisdictions. For this reason, we believe our proposal will meet **Goal 1, Objective 1.1 of the Montana Land Information Plan for fiscal year 2010; *Funding and administrative support for local, tribal, state and federal data collection efforts that will help develop and maintain multi-jurisdictional MSDI framework layers.***

Stakeholders of this project will benefit by having 1) access to an easy-to-use navigational aid for Carbon County, 2) improved transportation/address GIS layer accuracy, and 3) improved

Carbon County GeoAtlas

- Over 1,000 print-ready maps for the County delivered on DVD
- Can be used in digital format or printed-on-demand for specific areas
- GeoPDF maps with real-world coordinates and searchable features
- Multiple basemaps including topographic, aerial and cadastral
- No GIS/GPS knowledge required; little training needed
- Distribution through the WWW
- Corrections and updates to maps directly imported into GIS using GeoPDF/Capturx technologies.
- Potential model for MSDI framework layer deployment and data capture

compliance with county rural address standards. We are confident that the GeoAtlas will accelerate and improve data collection/correction of our county rural address GIS database and ultimately improve response times in emergency situation.

Without MLIA funding, it is unlikely that the GeoAtlas will be developed. It was attempted once before in 2006, but without adequate resources, the atlas was never developed. Without the GeoAtlas, emergency responders will continue to lack the navigational tools needed improve response times. Improvements to the accuracy of the road and address database will take much longer. Most importantly, lives may be at stake if the response to an emergency situation is delayed due to misrouted dispatch.

The Carbon County Disaster and Emergency Services (DES) office and the Carbon County Commissioners will provide long-term support of the GeoAtlas with dedication of staff/consultant time to maintain and improve the atlas. The DES office currently maintains the rural address GIS database for the County and is committed to improving its accuracy with the adoption of the GeoAtlas.

Technical Approach

a. Scope of Work

The proposed scope of work consists of four phases as described below.

Design and Testing. Design and layout of a county road/address atlas began in 2006 but was not completed due to lack of funding. We intend to build upon the original design to create the GeoAtlas. The current layout divides the County into a system of tiles, ¼ township (3x3 miles), in size. This will result in 245 standardized map pages produced at a 1:25,000 scale. In addition to these map pages, we will produce larger-scaled maps for areas with high residential density (i.e., cities/towns and residential subdivisions). Each map page will contain three optional basemaps; topographic, aerial and cadastral. We will likely use the DS Mapbook extension of ArcGIS to produce the map layouts and export them to GeoPDF using the TerraGo Map2PDF toolbar. In total we expect the GeoAtlas to contain over 1,000 maps. The design, layout and testing of a prototype will be completed with the assistance of a GIS consultant.

GeoAtlas Production. Production of the GeoAtlas will be completed by RLFR with a total of 100 softcopies (DVD) and approximately 50-75 hardcopies expected to be produced. The Department will purchase a laptop and high-speed laser printer to mass-produce the atlas. This equipment will ultimately reside in the Department's incident command bus and will serve as a print-on-demand system during emergencies.

Distribution and Training. The GeoAtlas will be delivered to the nine rural fire districts, three ambulance districts, Sheriff's Office, CCSAR, DES, four police departments and the County's dispatch office. An overview of the GeoAtlas and its functionality will be presented a quarterly meeting of the Carbon County Fire Council. We also plan to conduct at least 2 training sessions on the use of the GeoAtlas, focusing mainly on the use of the Capturx pen technology and how to properly update rural address data.

Field Test & Review. Three months after delivery of the GeoAtlas to emergency responders, we will follow up with the captains to review its use within the departments/districts. The evaluations we receive will help direct future revisions and enhancements to the GeoAtlas.

b. Deliverables

We will produce and deliver 100 softcopies on DVD and 50-75 printed copies of the GeoAtlas to emergency responders in Carbon County. We will also deliver soft/hard copies (as-needed) to the MLIA board for review and testing. The project will develop detailed metadata for the County's transportation and addressing GIS layers and will be made available through the Montana GIS Portal. In addition, the County will work with the State in signing a MOU to facilitate the sharing of transportation, structures and addressing data.

c. Acceptance Criteria

Successful completion of this project will result in the production and distribution of the Carbon County GeoAtlas. We will consider the project a long-term success if the GeoAtlas is in use by all departments throughout the County by the end of the 2011. We will continue to monitor the adoption of the GeoAtlas through future county emergency management gatherings, such as fire council meetings.

d. Timeline

This project has a planned duration of one year starting in June 2009 and ending in May 2010. The following timeline shows the duration (by month) of four planned project phases.

Project Phases	2009							2010				
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
1. Design & Testing												
2. GeoAtlas Production												
3. Distribution & Training												
4. Field Test & Review												

e. Staff Roles

Red Lodge Fire and Rescue will administer this project because they are the department most involved with GIS and because they have the infrastructure to support the development of the GeoAtlas. The Department owns an incident command bus equipped with desktop GIS, mapping grade GPS and a large format printer for mobile emergency response. They also have a trained GIS professional on staff to help coordinate the Department's GIS activities.

RLFR will be responsible for overall project administration, coordination and training of the County emergency responders. The department will assist with production of the GeoAtlas and provide 40 hours of in-kind contribution toward project completion.

3. Geography Affected

The GeoAtlas, covering all of Carbon County, will directly benefit the following emergency responders:

- Carbon County Disaster & Emergency Services (DES)
- Carbon County Sheriff's Office
- Carbon County Search & Rescue (CCSAR)
- Nine rural/city fire districts
- Three ambulance districts
- Four city police departments

In addition, the GeoAtlas will also assist many private businesses including the Postal Service, UPS, FedEx, and real estate professionals. We also intend to deliver our road centerline data to NAVTEQ, a private company who provides digital street data to leading GPS manufacturers, such as Garmin, Ltd. This will ensure that the County's data will be integrated with commercially available GPS products. The bottom line is that every citizen of Carbon County could potentially benefit from this project. Anyone in need of emergency services may experience faster response with the aid of the GeoAtlas.

4. Detailed Budget

The total budget for this project is \$47,350 with \$39,750 being requested from the MLIA grant program. The applicant's contribution will consist of \$7,600 in both hard and in-kind match. The hard money contributed by the applicant (\$6,100) will be used to purchase the Capturx software, digital pens and supplies. The in-kind match will be provided by RLFR through the contribution of staff time developing the GeoAtlas (approximately 50 hours).

We are requesting \$10,500 be granted to the RLFR for project administration, production, distribution and training. We are also requesting \$13,000 to cover the costs associated with hiring a GIS consultant to with the design, development and testing of the GeoAtlas. (*Note: an estimate of \$13k was provided to us by a local GIS consultant for reference*). The remaining funds will be used printing and production supplies, travel for training and demonstration.

Category	Applicant Share (including in-kind)	MLIA Share	Other Share	Total
a. Personnel RLFR	1500	10500		12000
b. Fringe Benefits		1200		1200
c. Travel Training & Demonstration		1700		1700
d. Equipment TerraGo GeoPDF software Capturx for ArcGIS software Digital Pens Laptop	 1500 1600 	 9500 1500 		

Color Laser Printer		2350		16450
e. Supplies				
Toner, binders, DVDs, Misc.	3000			3000
f. Contractual				
GIS Consultant		13000		13000
g. Other				
Totals	\$7600	\$39750		\$47350

5. **Statements of support.** Please see Appendix B listing letters of support from the following people:

- Jon Trapp, Carbon County Search & Rescue
- Tom Rieger, Carbon County Sheriff
- Josh Dorris, DOA-ITSD/BMSC, Transportation Framework Lead

6. Renewable Grant Accountability Report

The City of Red Lodge/Red Lodge Fire & Rescue applied for and received MLIA funding in 2008. A status report and expense summary for the project was submitted in February of 2009.

7. Authorized Signature

Authorizing Statement

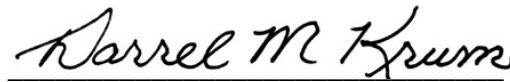
I hereby certify that the information and all statements in this application are true, complete and accurate to the best of my knowledge and that the project or activity complies with all applicable state, local and federal laws and regulations.

I further certify that this project will comply with applicable statutory and regulatory standards.

I further certify that I am (we are) authorized to enter into a binding agreement with the Montana Department of Administration to obtain a grant if this application receives approval.

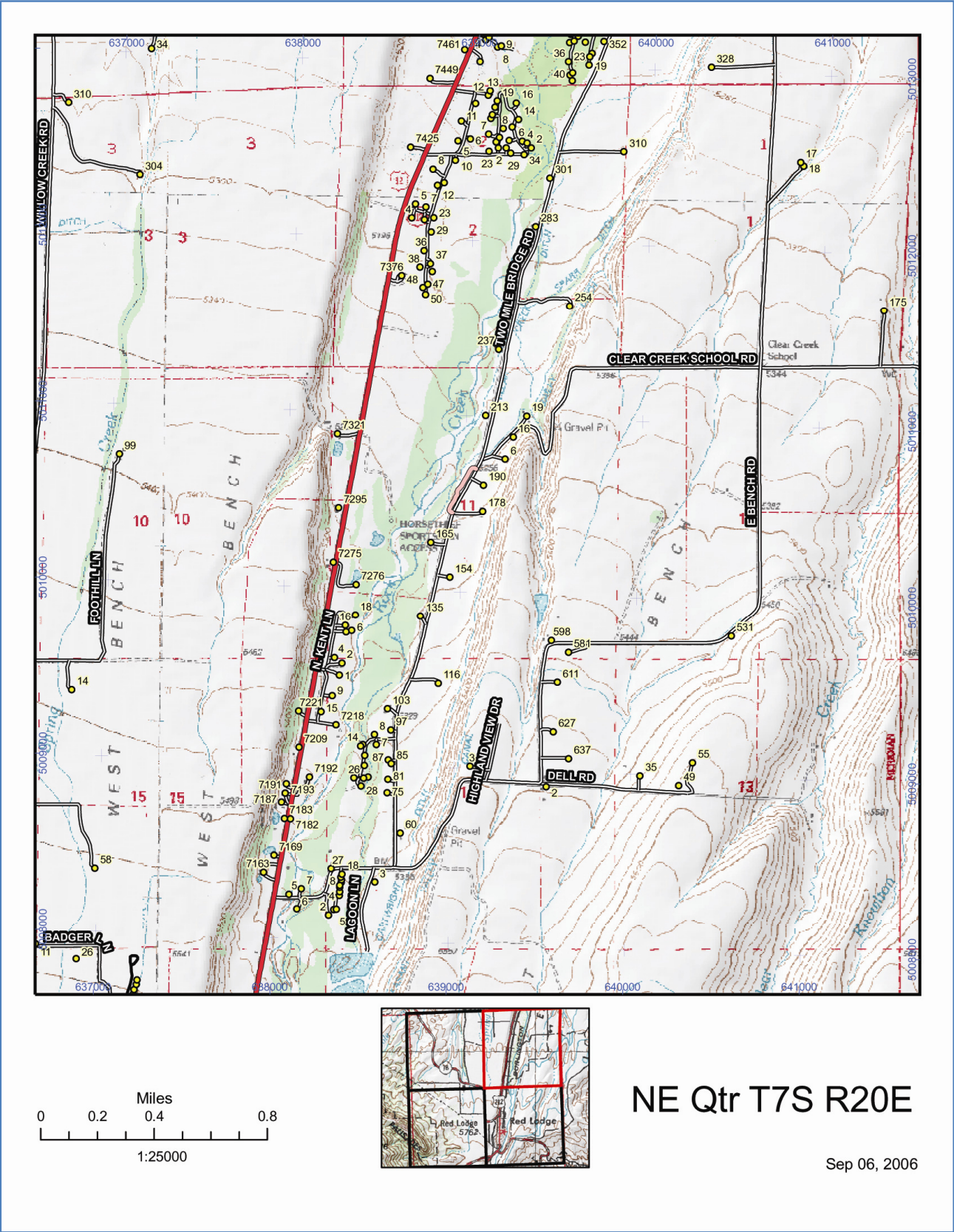
_____ **Date** February 13, 2009

Tom Kuntz, Fire Chief, Red Lodge Fire & Rescue

 **Date** February 13, 2009

Darrel Krum, Carbon County Disaster & Emergency Services

Appendix A. Example page of the Carbon County GeoAtlas with topographic base map.



Appendix B. Letters of Support.

See attached